

WHAT IS CLAIMED IS:

1. A method for classifying facial images from a temporal sequence of images, the method comprising the steps of:

a) training a classifier device for recognizing facial images, said classifier device being trained with input data associated with a full facial image;

b) obtaining a plurality of probe images of said temporal sequence of images;

c) aligning each of said probe images with respect to each other;

d) combining said images to form a higher resolution image; and,

e) classifying said higher resolution image according to a classification method performed by said trained classifier device.

2. The method of claim 1, wherein each face is oriented differently in each probe image.

3. The method of claim 1, wherein the probe images are warped slightly with respect to each other so that they are aligned.

4. The method of claim 3, wherein said step b) includes automatically extracting successive face images from a test sequence from the output of a face detection algorithm.

5. The method of claim 3, wherein said aligning step c) includes the step of orientating each probe image and warping each image on to a frontal view of the face.

6. The method of claim 5, wherein said warping of an image comprises the steps of:

finding a head pose of said detected partial view;

defining a generic head model and rotating said generic head model (GHM) so that it has the same orientation as the given face image;

translating and scaling said GHM so that one or more features of said GHM coincide with the given face image

recreating said image to obtain a frontal view of the face.

7. The method of claim 1, wherein said steps a) and e) include implementing a Radial Basis Function Network.

8. The method of claim 6, wherein the training step a) comprises:

(a) initializing the Radial Basis Function Network, the initializing step comprising the steps of:

fixing the network structure by selecting a number of basis functions F , where each basis function I has the output of a Gaussian non-linearity;

determining the basis function means μ_I ,
where $I = 1, \dots, F$, using a K-means clustering algorithm;
determining the basis function variances σ_I^2 ;
and

determining a global proportionality factor
 H , for the basis function variances by empirical search;

(b) presenting the training, the presenting step
comprising the steps of:

inputting training patterns $X(p)$ and their
class labels $C(p)$ to the classification method, where the
pattern index is $p = 1, \dots, N$;

computing the output of the basis function
nodes $y_I(p)$, F , resulting from pattern $X(p)$;

computing the $F \times F$ correlation matrix R of
the basis function outputs; and

computing the $F \times M$ output matrix B , where d_j
is the desired output and M is the number of output classes
and $j = 1, \dots, M$; and

(c) determining weights, the determining step
comprising the steps of:

inverting the $F \times F$ correlation matrix R to
get R^{-1} ; and

solving for the weights in the network.

9. The method of claim 8, wherein the
classifying step e) comprises:

presenting an unknown higher resolution image
from said temporal sequence to the classification method;
and

classifying each higher resolution image by:
computing the basis function outputs, for all F
basis functions;
computing output node activations; and
selecting the output z_j with the largest value and
classifying said higher resolution image as a class j .

10. The method of claim 1, wherein the
classifying step comprises outputting a class label
identifying a class to which the unknown higher resolution
image object corresponds to and a probability value
indicating the probability with which the unknown pattern
belongs to the class for each of the two or more features.

11. An apparatus for classifying facial images
from a temporal sequence of images, the apparatus
comprising:

- a) classifier device trained for recognizing
facial images from input data associated with a full facial
image;
- b) mechanism for obtaining a plurality of probe
images of said temporal sequence of images;
- c) mechanism for aligning each of said probe
images with respect to each other and, combining said
images to form a higher resolution image, wherein said
higher resolution image is classified according to a
classification method performed by said trained classifier
device.

12. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for classifying facial images from a temporal sequence of images, the method comprising the steps of:

a) training a classifier device for recognizing facial images, said classifier device being trained with input data associated with a full facial image;

b) obtaining a plurality of probe images of said temporal sequence of images;

c) aligning each of said probe images with respect to each other;

d) combining said images to form a higher resolution image; and

e) classifying said higher resolution image according to a classification method performed by said trained classifier device.